TITLE : **AIR OVER WATER DEMOLITION**

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BACKGROUND of the INVENTION

Prior state of the art means to dislodge, demolition, or make vacuum able substances such as dirt, chemicals, or earth to be moved or vacuumed have consisted of mechanical boring or digging means or constant pressure pumped liquid or air impingement.

BRIEF DESCRIPTION of the INVENTION

The present invention is a means to produce an intermittent pulse blast of liquid as a bullet to blast loose, demolition or make vacuum able a substances such as earth, dirt or rock or chemical. A liquid is pressure pumped into a chamber of pre pressurized air. The liquid pumped into the air chamber further pressurizes the air to the equivalent pressure of the liquid thus the compressed air serves as the propellant to propel the liquid. This produces an air over water blaster. The propellant of the liquid may also be produced by pumping the liquid into a pressure vessel and providing an electrical spark or electrical charge to the liquid. The electrical pulse is sufficient to vaporize a portion of the liquid. The vaporized liquid expansion generates elevated pressure and volume and propels the liquid as a bullet to impact the solid thus cracking or dislodging it.

Brief Description of the Drawings

Fig. 1 is an example of a first embodiment of an air over water pulse demolition means.

A compressed gas is used to propel water as an impact substance against material to be loosened or broken into pieces. The loosened material can then be easily removed either by vacuum or mechanical means, for example, a backhoe or screw conveyor.

Fig. 2 is a second embodiment of an air over water pulse demolition means. The gas over liquid container has a vacuum conduit going through said tank. The second end of the vacuum conduit has a manifold distribution means to distribute the propelled liquid and air in proximity to the circumference of the second end of the vacuum conduit. An end view of the vacuum conduit circumference manifold liquid and air distribution means is shown.

Fig. 3 is similar to Fig. 2 except that the second embodiment of the invention is shown digging in the ground.

Fig. 4 is an enlargement of the first end of the vacuum conduit with a manifold distribution means around its circumference.

Fig. 5 is a third embodiment of a liquid pulse demolition means. In this embodiment an electrical charge is passed between two electrodes and a conductive liquid is present between the electrodes. The electrical charge flows through the liquid as said electrical charge passes from one electrode to the other. As the electrical charge passes through the water, the water is heated to flash point. Expansion, due to the liquid changing from the liquid phase to the gaseous phase, propels the remaining liquid to impact, dislodge and make vacuum able the dirt or material it impacts.

FIG. 6 is similar to fig. 1 except that a diaphragm is used between the liquid and gas.

FIG. 7 is a cross section view of a means to automatically control the functions and discharge of the air over water process.

DESCRIPTION of the PREFERED EMBODIMENT

A vacuum conduit 12 with a first end is placed in proximity to the earthen dirt 11 to be dug, the second end of said vacuum conduit 12 is attached to a vacuum producing means. Vacuum able dirt 11 is vacuumed into the first end of the vacuum conduit 12 and then vacuumed through the conduit 12 to the second end having means to store or discharge the vacuumed contents.

Air 1 and or water 2 under pressure may be directed to impact the substance 11 to be vacuumed. The air 1 and or water 2 under pressure impact the substance 11 to be vacuumed in proximity to the first end of the vacuum conduit 12 in order to make the substance 11 to be vacuum able.

The impact liquid 2 may be directed to impact as a continuous flow of water 2 under pressure or as a pulsed liquid 2 under pressure. The pulsed impact uses leass liquid to accomplish greater loosening of the ground 11.

The first and second embodiment of the invention compresses air 1 over water 2 within a container 3. The air 1 enters container 3 through conduit 4 and valve 5. The liquid 2 enters container 3 through conduit 6 and valve 7 with container 3 discharge valve 8 closed. Monitor/controller 16

sequences the opening and closing of valve 8, valve 7 and valve 5. Conduit 9 is used to direct the water 2 to the impact 10 point of the ground 11.

A manifold 13 may be placed around the first end of vacuum conduit 12 in order to distribute the liquid 2 around the circumference of the first end of vacuum conduit 12. The manifold 13 is useful to distribute water 2 or air 1 either under steady continuous flow under pressure or pulsed flow under pressure. Manifold 13 may be created by placing an outer container wall 16 around an inner container wall 17 which may serve both the outer wall of the vacuum conduit 12 and the inner wall of the manifold 13.

Liquid 2 and or air 1 enter manifold 13 through conduit 9 and exit manifold 13 through orifices 14 located in ring 15 which make up the discharge end of manifold 13 and serves to attach inner manifold wall 17 to outer wall16. The less distance there is between the discharge of the liquid 2 and or air 1 and the dirt 11 to be impacted 10, the greater the energy force of the impact. Also, discharging completely around the circumference of the vacuum conduit 12 allows more even distribution of impact energy to dislodge and make vacuum able the dirt 11 or substance to be vacuumed. In other words, impact energy is lost when water 2 or air 1 under pressure have to travel a distance through the atmosphere before impacting the dirt 11.

Also, the impact force is more effective at loosening dirt 11 if the impact force is evenly distributed over the specific area to be loosened.

Examples of operating embodiment one and two are:

Example A

1. Close valve 8 and 7
2. Open valve 5 and fill chamber 3 with 150 psi air
3. Close valve 5
4. Open valve 7 and fill chamber 3 with 4000 psi water, thus compressing the air to 4000 psi. Now there is 4000 psi compressed air over 4000 psi water.
5. Close valve 7
6. Monitor/controller 31 opens valve 8 thus releasing the liquid 2 propelled by the compressed gas 1 through conduit 9.

Example B

1. Close valve 8 and 5
2. Open valve 7 and fill container 3 partially full and then close valve 7.
3. Open valve 5 and fill container 3 with 150 psi air 1 then close valve 5. Thus there is now 150 psi compressed air over 150 psi water.

4. Monitor/controller 31 opens valve 8 thus releasing the liquid 2 propelled by the compressed gas 1 through conduit 9.

In a third embodiment, a gas 1 over liquid 2 impulse means may be created in container 3 by disposing within container 3 a positive electrode 20 and a negative electrode 21 in proximity to each other, filling container 3 with water and passing an electrical charge from positive electrode 20 to negative electrode 21 thus producing an energy discharge in the form of an electrical spark 22. The electrical spark 22 transfers energy into the water 2 which surrounds the two electrodes thus boiling (adding sufficient energy to a quantity of water to change phase from liquid to gas) a percentage of the liquid. The expansion of the evaporated liquid creates compressed gas over the liquid. Monitor/controller 31 senses the increase in pressure, opens valve 8 and allows the compressed gas to force the remainder of liquid 2 to be directed through conduit 9 thus impacting 10 the dirt 11 causing it to be loosened and made vacuum. Controller 31 may consist of a vent 25, a liquid inlet 26, a liquid outlet 31, a spring or pressure resistance means 27, a differential pressure adjustment means 28, a piston 29, and a closure rod or valve means 30.